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IS 10482-1 (1983): Connectors for Printed Wiring Board,
Part 1: Test Schedule and Requirements [LITD 3:
Electromechanical Components and Mechanical Structures for
Electronic Equipment]



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“Knowledge is such a treasure which cannot be stolen”

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IS : 10482 (Part I) - 1983

Indian Standard

SPECIFICATION FOR
CONNECTORS FOR PRINTED WIRING BOARD

PART 1 TEST SCHEDULE AND REQUIREMENTS

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INDIAN STANDARDS INSTITUTION
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*Indian Standard*SPECIFICATION FOR
CONNECTORS FOR PRINTED WIRING BOARD

PART 1 TEST SCHEDULE AND REQUIREMENTS

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Indian Standard

SPECIFICATION FOR CONNECTORS FOR PRINTED WIRING BOARD

PART 1 TEST SCHEDULE AND REQUIREMENTS

0. FOREWORD

0.1 This Indian Standard (Part 1) was adopted by the Indian Standards Institution on 28 February 1983 after the draft finalized by the Connectors for Electronic Equipment Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

0.2 This standard (Part 1) is one of the Indian standards on low frequency connectors below 3 MHz used in electronic equipment and shall be used in conjunction with IS : 9647-1980 Specification for general requirements and methods of tests for low frequency connectors below 3 MHz including dc. Subsequent parts of this standard will cover detail specifications for specific types of connectors.

0.3 While preparing this standard, assistance has been derived from JSS 50806 Detail Specification for Connectors Electrical Printed Wiring Board General Purpose, issued by the Ministry of Defence, India.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard (Part 1) specifies the test schedule and requirements applicable for a range of connectors for 0.80 mm, 1.20 mm, 1.60 mm and 3.2 mm printed wiring boards, and for interconnection between printed wiring boards.

NOTE — These connectors are intended to provide reliable connection between printed wiring and conventional wiring, and also those intended to provide connection of printed wiring on one board to printed wiring of another board.

*Rules for rounding off numerical values (revised).

2. TERMINOLOGY

2.0 For the purpose of this standard, terms and definitions are given in IS : 1885 (Part XL)-1974* and IS : 9647-1980†.

3. MATERIAL AND WORKMANSHIP

3.1 The materials used and workmanships shall be in accordance with **4** of IS : 9647-1980‡.

4. TYPE DESIGNATION

4.1 Connector Categories

4.1.1 *Categories A and AD (Card Insertion Connectors)* — Connector sockets containing two contacts within each contact cavity, each of which engages a contact on an opposite side of a printed wiring board. In Category A connectors, the two contacts in each cavity are electrically common. In Category AD connectors the two contacts in each cavity are electrically isolated between each other.

4.1.2 *Category C* — A connector assembly consisting of a male adapter mating with a connector concept.

4.1.3 *Category CR (Sockets)* — Composite connector having a solder type or removable crimp type female contact inserted into and mechanically retained in a socket housing, or composite contacts mounted on individual intermating printed wiring board Category CR contacts mate with CS contacts.

4.1.4 *Category CS (Adapter)* — Composite connectors having individual contacts attached to a printed wiring board or retained in an assembly attached to a printed wiring board Category CS contacts made with Category CR contacts.

4.1.5 *Category D (Card Insertion Connector)* — A Category AD connector socket which accommodates a removable crimp type male contact.

*Electrotechnical vocabulary: Part XL Connectors.

†Specification for general requirements and methods of tests for low frequency connectors below 3 MHz including DC.

‡Specification for general requirements and methods of tests for low frequency connectors below 3 MHz including dc.

4.2 Termination Class — The class is identified by a single-letter symbol which denotes the type of termination as shown below:

<i>Symbol</i>	<i>Termination</i>
<i>a</i>	Straight, eyelet solder termination
<i>b</i>	Straight, plug-in, solder termination
<i>c</i>	Removable crimp or solder termination
<i>d</i>	Wire wrapped termination
<i>e</i>	Wire clipped termination
<i>f</i>	Welded termination

4.3 Board Thickness Category — The size is identified by a single digit symbol which indicates the thickness of the applicable mating printing wiring board as shown below:

<i>Symbol</i>	<i>Size (Thickness of Printed Wiring Board)</i>
	mm
0	0.80
1	1.20
2	1.60
3	3.20

4.4 Mounting Provision — The mounting provision is identified by a single letter symbol as shown below:

<i>Symbol</i>	<i>Mounting Provision</i>
<i>A</i>	Clearance hole of specified diameter at both ends of the connector
<i>B</i>	Trapped insert of specified thread at both ends of the connector
<i>C</i>	Floating feed-through bushing of specified dimension at both ends of the connector
<i>D</i>	Contacts composite (individual) attached to printed wiring board by mechanical stacking prior to soldering

4.5 Connectors according to this standard shall be designated by:

- A reference number to the Indian Standard,
- The letters IS represents Indian Standard,

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- c) The number denoting the type of connector,
- d) The number representing the number of contacts,
- e) The letters indicated in **4.2** representing the termination class,
- f) The number denoting the board thickness category,
- g) The letters indicated in **4.4** denoting the mounting provision, and
- h) Contact finish thickness in micron.

4.6 The type designation shall be given in accordance with **4.5** for example:

XXXX IS-YY-ZZ-a/b/c/d/e/f-Q-A/B/C/D-T₁/T₂.

where

XXXX represents the reference number of Indian Standard of Sectional Specification,

IS denotes Indian Standard,

YY denotes the number allotted to the type of connector,

ZZ represent the number of contacts,

a/b/c/d/e/f indicates the termination class,

Q denotes the number of the board thickness category in accordance with **4.3**,

A/B/C/D denotes the mounting provision,

T₁ represents the contact base finish thickness, and

T₂ represents the contact final finish thickness.

4.7 Type Designation — The type designation of a particular connector shall be specified in the relevant specification.

5. MARKING

5.1 The connectors shall be marked in accordance with **6** of IS : 9647-1980*.

6. CLIMATIC CATEGORY

6.1 The climatic characteristics shall generally be chosen in accordance with **3** of IS : 9647-1980*.

6.2 The climatic characteristics for a particular type of connector shall be specified in the relevant specification.

*Specification for general requirements and methods of tests for low frequency connectors below 3 MHz including dc.

7. ELECTRICAL RATINGS

7.1 The rated voltage and rated current shall be specified in the relevant specification.

8. TESTS

8.1 General — The test schedule specifies the tests and the order in which they shall be carried out as well as the requirements to be met.

8.2 Conditions of Tests — The provisions of **8** of IS: 9647-1980* shall apply.

8.3 Classification of Tests — The provisions of **7** of IS: 9647-1980* shall apply.

8.4 Test Schedules

8.4.1 Type Tests—The test schedule for type tests including the sequence of tests and the number of samples shall be as specified in Table 1.

8.4.1.1 The manufacturer shall submit 22 samples of the connectors (with mating parts, wherever applicable) for which type approved is desired. If the approval is desired for more than one type of the same family of the connector, the manufacturer shall submit three additional samples in each type. These shall be subjected to the tests of zero group and first group only.

TABLE 1 SCHEDULE OF TYPE TESTS

SL No.	TEST	CLAUSE REF OF IS : 9647-1980*	CONDITION OF TEST	REQUIREMENT
(1)	(2)	(3)	(4)	(5)
1.	Zero group all 22 samples			
	a) Visual examination	9	—	
	b) Dimensions	10	—	See relevant specification
	c) Polarisation	13.14	—	—
	d) Maintenance ageing (for removable contacts only)	13.4	—	—

*Specification for general requirements and method of test for low frequency connectors below 3 MHz including dc.

(Continued)

*Specification for general requirements and methods of tests for low frequency connectors below 3MHz including dc.

TABLE 1 SCHEDULE OF TYPE TESTS — *Contd*

Sl. No.	TEST	CLAUSE REF OF IS : 9647-1980*	CONDITION OF TEST	REQUIREMENT
(1)	(2)	(3)	(4)	(5)
e)	Insertion and withdrawal	14.1	—	See relevant specification
f)	Low level circuit	13.2	—	—
g)	Contact resistance	12.1	—	10 m ohms, <i>Max</i>
h)	Voltage proof	12.5	3 times of rated Voltage	—
j)	Insulation resistance	12.4	—	100 or 1000 m ohms, <i>Min</i> (see relevant specification)
2.	First group (6 samples)			
a)	Soldering	13.15	Recovery period two hours	—
i)	Visual examination	9	—	—
b)	Robustness of terminations	13.16	—	—
i)	Visual examination	9	—	—
ii)	Contact resistance	12.1	—	15 m ohms, <i>Max</i>
c)	Bump	14.11	—	—
i)	Visual examination	9	—	—
ii)	Contact resistance	12.1	—	15 m ohms, <i>Max</i>
d)	Vibration	14.13	—	—
i)	Visual examination	9	—	—
ii)	Contact resistance	12.1	—	15 m ohms, <i>Max</i>
e)	Shock	14.12	—	—
i)	Visual examination	9	—	—
ii)	Contact resistance	12.1	—	15 m ohms, <i>Max</i>
f)	Acceleration (steady)	14.10	—	—
i)	Visual examination	9	—	—
ii)	Contact resistance	12.1	—	15 m ohms, <i>Max</i>

*Specification for general requirements and methods of test for low frequency connectors below 3 MHz including dc.

(*Continued*)

TABLE 1 SCHEDULE OF TYPE TESTS — *Contd*

Sl. No.	TEST	CLAUSE REF OF IS : 9647-1980*	CONDITION OF TEST	REQUIREMENT
(1)	(2)	(3)	(4)	(5)
g)	Rapid change of temperature	16.4	—	—
i)	Visual examination	9	—	—
ii)	Voltage proof	12.5	Initial test voltage [see 1 (h)]	—
iii)	Insulation resistance	12.4	—	See relevant specification
iv)	Contact resistance	12.1	—	15 m ohms, <i>Max</i>
h)	Dry heat	16.2.1	See relevant specification	—
i)	Visual examination	9	—	—
j)	Damp heat (accelerated) (first cycle)	16.2.2	—	—
i)	Visual examination	9	—	—
k)	Cold	16.2.3	—	—
i)	Visual examination	9	—	—
ii)	Insertion and withdrawal force, when specified	14.1	—	See relevant specification
m)	low air pressure	16.2.4	see relevant specification	—
i)	Voltage proof	12.5	40 percent of initial test voltage	—
n)	Damp heat, accelerated (remaining cycle)	16.2.5	—	—
i)	Visual examination	9	—	—
ii)	Voltage proof	12.5	Initial test voltage [see 1 (h)]	—
iii)	Insulation resistance	12.4	—	See relevant specification

*Specification for general requirements and methods of test for low frequency connectors below 3 MHz including dc.

(Continued)

TABLE 1 SCHEDULE OF TYPE TESTS — *Contd*

Sl No.	TEST	CLAUSE REF OF IS : 9647-1980*	CONDITION OF TEST	REQUIREMENT
(1)	(2)	(3)	(4)	(6)
	iv) Contact resistance	12.1	—	15 m ohms, <i>Max</i>
	v) Insertion and withdrawal force	14.1	—	<i>See</i> relevant specification
3.	Second Group (4 samples)			
	a) Damp heat (long term exposure)	16.3	Duration 21 or 56 days as specified	—
	i) Visual examination	9	—	—
	ii) Voltage proof	12.5	Initial test voltage [<i>see</i> 1 (h)]	—
	iii) Insulation resistance	12.4	—	<i>See</i> relevant specification
	iv) Contact resistance	12.1	—	15 m ohms, <i>Max</i>
	v) Insertion and withdrawal force	14.1	—	<i>See</i> relevant specification
4.	Third Group (4 samples)			
	a) Mechanical endurance test	17	<i>see</i> relevant specification	—
	i) Visual examination	9	—	—
	ii) Voltage proof	12.5	Initial test voltage [<i>see</i> 1 (h)]	—
	iii) Insulation resistance	12.4	—	<i>See</i> relevant specification
	iv) Contact resistance	12.1	—	15 m ohms, <i>Max</i>
	v) Insertion and withdrawal force	14.1	—	<i>See</i> relevant specification
	b) Electrical endurance test	10	<i>See</i> relevant specification	—
	i) Visual examination	9	—	—
	ii) Voltage proof	12.5	Initial test voltage <i>see</i> 1 (h)]	—
	iii) Insulation resistance	12.4	—	<i>See</i> relevant specification

*Specification for general requirements and methods of test for low frequency connectors below 3 MHz including dc.

(*Continued*)

TABLE 1 SCHEDULE OF TYPE TESTS — *Contd*

Sl. No.	TEST	CLAUSE REF OF IS: 9647-1980*	CONDITION OF TEST	REQUIREMENT
(1)	(2)	(3)	(4)	(5)
	iv) Contact resistance	12.1	—	15 m ohms, <i>Max</i>
	v) Insertion and withdrawal force	14.1	—	<i>See relevant specification</i>
5.	Fourth Group (2 samples)			
	a) Mould growth	16.6	—	—
6.	Fifth Group (2 samples)			
	a) Salt mist	16.7	—	—
	i) Visual examination	9	—	—
	ii) Voltage proof	12.5	Initial test voltage [see 1 (h)]	—
	iii) Insulation resistance	12.4	—	<i>See relevant specification</i>
	iv) Contact resistance	12.1	—	15 m ohms, <i>Max</i>
	v) Insertion and withdrawal force	14.1	—	<i>See relevant specification</i>
7.	Sixth Group (2 samples)			
	a) Contact retention (insert), when specified	14.4	—	—
	i) Visual examination	9	—	—
	b) Board insertion force (over stress), when specified	†		
	i) Visual examination	9	—	—
	c) Resistance to solvent, when specified	13.11	—	—
	i) Visual examination	9	—	—

NOTE 1 — The thickness of the plating on the contacts of one sample shall be checked in accordance with the methods specified in IS : 3203-1982‡ for compliance with the requirements of the relevant specification.

NOTE 2 — Two samples shall be as spare.

*Specification for general requirements and methods of test for low frequency connectors below 3 MHz including dc.

†*Board Insertion Force* — Connectors shall be tested for high insertion force by inserting a test board as specified and applying a force of 225 N in the direction of insertion. These shall be no evidence of physical damage.

‡Method of testing local thickness of electroplated coatings.

8.4.2 Routine Tests — The following tests shall be carried out in the order stated:

- a) Visual examination [see 9 of IS : 9647-1980*].
- b) Voltage proof [see 12.5 of IS : 9647-1980*].

8.4.3 Acceptance Tests — Two groups of samples (Group A and Group B) shall be selected (see Appendix B of IS : 2612-1965†) preferably at random from the lot that has passed routine tests stated in 8.4.2 above. Each group of connectors shall be subjected to the tests in the order given in Table 2.

TABLE 2 SCHEDULE OF ACCEPTANCE TESTS

TEST	CLAUSE - REF OF IS : 9647- 1980*	AQL (PERCENT DEFECTIVE)	INSPECTION LEVEL†	D/ND‡
(1)	(2)	(3)	(4)	(5)
<i>Group 'A'</i>				
Insertion and withdrawal force	14.1	1	II	ND
Contact resistance	12.1			
Insulation resistance	12.2			
Bond strength body assembly	14.9			
<i>Group 'B'</i>				
<i>Sub-Group 1</i>				
Dimensions and mass	10	4	S-3	ND
<i>Sub-Group 2</i>				
Mechanical Endurance Tests	17	4	S-3	ND
Electrical Endurance Test	18			

(Continued)

*Specification for general requirements and methods of tests for low frequency connectors below 3 MHz including dc.

†Recommendation for type approval and sampling procedures for electronic components.

TABLE 2 SCHEDULE OF ACCEPTANCE TESTS — *Contd*

TEST	CLAUSE REF OF IS : 9647- 1980*	AQL (PERCENT DEFECTIVE	INSPECTION LEVEL†	D/ND‡
(1)	(2)	(3)	(4)	(5)
<i>Sub-Group 3</i>				
Mechanical ageing (removable contacts only)		4	S-3	D
Soldering	13.14			
Robustness of termination	13.15			
Bump	14.11			
Climatic sequence	16.2			
<i>Sub-Group 4</i>				
Salt mist, when specified	16.7	—	—	—

NOTE 1 — Three samples shall be submitted to salt mist test irrespective of the lot size. In case only one sample fails, additional size samples shall be drawn and tested. The lot shall be rejected in case of any further failure.

NOTE 2 — The thickness of the plating of the contacts of one sample in respect of the lot size shall be checked in accordance with the methods specified in 3203-1982§ for compliance with the requirements of relevant specification. Non-compliance shall constitute rejection of the lot.

*Specification for general requirements and methods of tests for low frequency connectors below 3 MHz including dc.

†Sampling plans and procedures for inspection by attributes for electronic items, (*under preparation*).

‡D — Destructive and ND — Non-destructive.

§Method of testing local thickness of electroplated coatings.

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

<i>Quantity</i>	<i>Unit</i>	<i>Symbol</i>
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

<i>Quantity</i>	<i>Unit</i>	<i>Symbol</i>
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

<i>Quantity</i>	<i>Unit</i>	<i>Symbol</i>	<i>Definition</i>
Force	newton	N	1 N = 1 kg.m/s ²
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m ²
Frequency	hertz	Hz	1 Hz = 1 c/s (s ⁻¹)
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m ²